

MILL MEADOW RESERVOIR



Introduction

Mill Meadow Reservoir is northwest of Loa at the base of the Fish Lake Mountains. It is an intermediate impoundment of a stream valley just below the confluence of the Fremont River and U M Creek.

The reservoir shoreline is administered by the Fishlake National Forest and publicly/privately owned. Public access is unrestricted. The shore within 1/4 mile of the dam is on BLM land, and the shore near the center of

the reservoir is privately owned. The impoundment, an earth-fill dam, was built in 1954.

Water is used primarily for irrigation and other agricultural purposes.

Recreation

Mill Meadow Reservoir is accessible from U-72.

Characteristics and Morphometry

Lake elevation (meters / feet)	2,341 / 7,681
Surface area (hectares / acres)	63 / 156
Watershed area (hectares / acres)	
Volume (m ³ / acre-feet)	
capacity	6,453,682 / 5,232
conservation pool	
Annual inflow (m ³ / acre-feet)	
Retention time (years)	
Drawdown (m ³ / acre-feet)	
Depth (meters / feet)	
maximum	20 / 66
mean	10.2 / 33.5
Length (meters / feet)	2,600 / 8,531
Width (meters / feet)	457 / 1,499
Shoreline (km / miles)	7.62 / 4.73

Location

County	Sevier, Wayne
Longitude / Latitude	111 33 53 / 38 30 24
USGS Map	Johnson Reservoir, Utah, 1968, Lyman, Utah 1985
DeLorme Atlas	pg.46,B2
Cataloging Unit	Fremont River (14070003)

From U-24 in the Loa area, go north on U-72 to Fremont Town and continue north for 2.5 miles to FS-036, a paved road to Johnson Valley Reservoir. Mill Meadow Reservoir is 2 miles up this road. From the north, travel 27 miles south on U-72 from Fremont Junction to FS-036.

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The lake offers fishing, boating and primitive camping.

Recreational facilities are limited at the reservoir with only restrooms and unimproved campsites. The nearest USFS campgrounds are near Johnson Valley Reservoir on FS-036. The Inn, an RV park, offers modern facilities in Fremont Town, 7 miles to the south.

Watershed Description

The reservoir is in an area of rolling ridges and valleys characteristic of the Fishlake Plateau. The watershed High point, the Fish Lake Hightop Plateau, is 3,945 m (11,633 ft) above sea level, thereby developing a complex slope of 6.9% to the reservoir. Inflows are the Fremont River and U M Creek. The average stream gradient above the reservoir is 4.0% (209 feet per mile). Upstream impoundments include Forsyth Reservoir (3 miles up U M Creek) and Johnson Valley Reservoir (about 13 miles up the Fremont River). The outflow is the Fremont River.

The soil is of limestone origin with rapid permeability and erosion is rapid. The soil associations that compose the watershed are listed in Appendix III.

The vegetation communities are comprised of pine, aspen, bitterbrush, mountain mahogany, pinyon-juniper and sage-grass. The watershed receives 51 - 102 cm (20 - 40 inches) of precipitation annually with a frost-free season of 80 - 100 days at the reservoir.

Land use is 98% multiple use and recreation, the major use of the watershed is livestock grazing and timber harvesting. The remaining 2% is private land used primarily for grazing. The land uses result in heavy runoff and substantial soil erosion.

Limnological Assessment

The water quality of Mill Meadow Reservoir is fair. It is considered to be moderately hard with a hardness concentration value of approximately 92 mg/L (CaCO₃). The only parameter that have exceeded State water quality standards for defined beneficial uses are phosphorus and dissolved oxygen on occasion. The average concentration of total phosphorus in the water column in 1981, 1989, and 1991 was 57.7, 169, and 77 ug/L which consistently exceeds the recommended pollution indicator for phosphorus of 25 ug/L. It is not uncommon to see values in excess of 100 ug/L. This reservoir has exhibited some of the highest productivity in the State. Dissolved oxygen concentrations in the hypolimnion have reached a low of 0.8 mg/L. As indicated by the profile of August 21, 1991 dissolved oxygen levels do decline downward in the water column but typically do not reach levels that impair the fishery during productivity season. In recent years the reservoir has been draw down extensively so that late summer substantiate the fact

that water quality impairments do exist. Concentrations dropped dramatically below the thermocline to approximately 3.0 mg/L. Although in 1981 the reservoir was characterized as a phosphorus limited system, the 1989-91 data suggest that the reservoir is currently a nitrogen limited system. TSI values indicate the reservoir is mesotrophic. The phosphorus concentrations in 1989 appear to be abnormally low (5.9 ug/L) and have shifted the overall TSI index to the low mesotrophic range. It does not appear that there has been a significant rise in the concentrations of nutrients in the lake since it was originally surveyed in 1981. In fact the concentration may have declined specifically the nitrogen species. The reservoir was stratified during a summer monitoring trip was in June, 1981 and September, 1991. Both profiles indicate that a thermocline developed at a depth of 2-3 meters. On September 5, 1991, consistent with the stratification there was a noticeable decline in the concentration of dissolved oxygen in the water column. These conditions are deleterious to the fishery rendered

Limnological Data

Data averaged from STORET sites: 595588, 595589

Surface Data	1981	1989	1991
Trophic Status	E	H	H
Chlorophyll TSI	-	70.28	79.62
Secchi Depth TSI	48.86	46.51	58.34
Phosphorous TSI	73.48	84.39	69.48
Average TSI	61.17	67.06	69.15
Chlorophyll <i>a</i> (ug/L)	-	57	160
Transparency (m)	3	2.6	0.9
Total Phosphorous (ug/L)	55	316	89
pH	8.0	8.6	9.2
Total Susp. Solids (mg/L)	<5	-	19
Total Volatile Solids (mg/L)	-	-	13
Total Residual Solids (mg/L)	-	-	14
Temperature (°C / °f)	12/54	17/62	16/60
Conductivity (umhos/cm)	207	177	285

Water Column Data

Ammonia (mg/L)	0.05	0.07	0.07
Nitrate/Nitrite (mg/L)	0.15	-	.02
Hardness (mg/L)	100	-	84.3
Alkalinity (mg/L)	92	-	92
Silica (mg/L)	-	-	24.5
Total Phosphorous (ug/L)	57.5	169	77

Miscellaneous Data

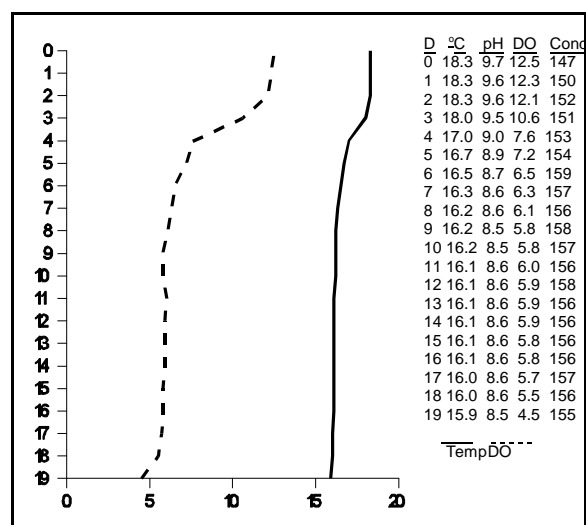
Limiting Nutrient	N	N	N
DO (Mg/l) at 75% depth	6.1	6.3	5.8
Stratification (m)	NO	NO	3-4
Depth at Deepest Site (m)	19	19.2	19.2

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approximately 1/2 of the water column unsuitable for a fishery. In addition dissolved oxygen concentrations at time have reached a critical state during the winter period for fish. The reservoir was surveyed on March 13, 1991 and near anoxic conditions were found present in the lower depths of the water column. Concentrations of dissolved oxygen at the surface were 7.8 mg/L but dropped to 3.5 mg/L at 1 meter and reached a low of 0.6 mg/L at the bottom (6 meters). Water temperature at that time was relatively uniform near 4.3 degrees C throughout the water column. According to DWR no fish kills have been reported in recent years. The reservoir supports populations of brook trout (*Salvelinus fontinalis*), rainbow trout (*Oncorhynchus mykiss*), cutthroat trout (*Oncorhynchus clarki*), and sculpins (*Cottus* spp.). Brook trout up to 5 pounds have been reported from Browne Reservoir.

Since the lake was acquired by the DWR and water levels stabilized, the riparian vegetation has become established along the shore, with a thin band of grass and sedges being the colonizing species. Eventually more riparian vegetation may provide significantly improved habitat for aquatic organisms.

The lake has not been treated for rough fish competition, so populations of native fishes may still be present in the lake. The reservoir is stocked annually with rainbow (*Oncorhynchus mykiss*) and cutthroat trout (*Oncorhynchus clarki*). Gill net surveys show that the Utah chub (*Gila atraria*), the redbside shiner (*Gila balteata*), and the Utah sucker (*Catostomus ardens*) are also present. Invertebrates, primarily midges were found. Plankton consisted of Copepods, Cladocerins, rotifers, and algae.



Historically, the DWR has stocked the reservoir annually with 10,000 - 20,000 fingerling rainbow trout. In

1991, the trout became infected with whirling disease, and the reservoir was treated with rotenone in 1992. It will be stocked with centrarchids rather than trout for until the late 1990s in order to allow the disease to become eradicated.

The reservoir was chemically treated by the DWR to control rough fish competition in 1966, 1978 and 1986 as well as in 1992.

Phytoplankton in the euphotic zone in August, 1991 included the following taxa:

Species	Cell Volume (mm ³ /liter)	% Density By Volume
<i>Aphanizomenon flos-aquae</i>	236.634	100.00
<i>Ankistrodesmus falcatus</i>	0.009	0.00
Total	236.643	

Shannon-Weaver Index[H']	0.00
Species Evenness	0.00
Species Richness	0.06

The flora indicates a very unhealthy reservoir. Cell biomass is very high and there is no diversity. *Aphanizomenon*, a blue-green alga, is an indicator of poor water quality.

Pollution Assessment

Nonpoint pollution sources include sedimentation and nutrient loading from grazing, and wastes or litter from recreation.

During the summer, 670 head of cattle graze in the watershed and around the reservoir. In 1992, there are several active timber sales in the Sheep Valley area of the U M Creek drainage, with 1,000,000 board feet of aspen being removed from a windstorm area. In the summer of 1992, FS-036 was widened and paved.

There are no point pollution sources in the watershed.

Information

Management Agencies

Fishlake National Forest	896-9233
Loa Ranger District	836-2811
Six County Government Association	
Division of Wildlife Resources	538-4700
Division of Water Quality	538-6146

Recreation

Panoramaland Travel Region (Richfield)	896-9222
The Inn RV Park, Fremont	836-2715

Reservoir Administrators

Fremont Irrigation Company

Beneficial Use Classification

The state beneficial use classifications include: boating and similar recreation (excluding swimming) (2B), cold water game fish and organisms in their food chain (3A) and agricultural uses (4).